

### **REMARKS**

This is in response to the Office Action mailed on June 1, 2004.

Claims 17, 19, 22, 26, 31, 32, 34, and 41, are amended, claims 33, 38, and 49 are canceled without prejudice or disclaimer, and claims 52 and 53 are added; as a result, claims 17-19, 22, 23, 25-27, 29, 31, 32, 34-37, 39-48, 50, 52, and 53 are now pending in this application.

### **Objection to the Drawings**

The Office Action indicates that

"The drawings were objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the transistor including a first source/drain region, a body region and a second source/drain region, that are vertically aligned and a trench capacitor.....coupled to the first source/drain region, and a second plate of polycrystalline material... that is coupled to the first plate (i.e. claim 17) must be shown or the feature(s) canceled from the claim(s).

Also, the transistor further including a gate adjacent to the body region and the gate being vertically aligned with the second plate must be shown. Fig. 1 does not show a gate. Fig. 6 is not shown a transistor that is vertically aligned. No new matter should be entered."

Regarding claim 17, Applicant respectfully points out that FIG. 1 shows all elements recited in claim 17. However, Applicant amended claim 17 for clarity.

Regarding the "gate" in the claims, Applicant points out that page 6 of the specification describes word line 112 of FIG. 1 in which word line 112 operates as a gate for access transistor 111 (for example, see lines 21-23). Therefore, the "gate" in the claims is shown in the drawings as element 112.

The Office Action also indicates that

"[T]he drawings are objected to as failing to comply with 37 CFR 1.84(p)(4) because references character "104" has been used to designate both access transistor and pillar. See page 6, line 21 and page 6, line 14. A proposed drawing correction or corrected drawings are required in reply to this Office Action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance."

Applicant submits that the reference number (111) of the access transistor in the drawings is correct. To make the drawings and the specification to have matching reference numbers, Applicant amended page 6, line 21 of the specification to change number 104 to number 111 so that access transistor 111 has a consistent reference number (111) throughout the specification and the drawings.

### **Objection to the Specification**

The Office Action indicates that

"[T]he amendments filed 7/21/03 and 10/14/03 are objected to under 35 USC 132 because it introduces new matter into the disclosure. 35 USC 132 states that no amendment shall introduce new matter into the disclosure of the invention. The added material which is not supported by the original disclosure is as follows: the transistor including a first source/drain region, a body region and a second source/drain region, that are vertically aligned and a trench capacitor...coupled to the first source /drain region, and a second plate of polycrystalline material ... that is coupled to a first plate and the transistor further including a gate adjacent to the body region and the gate being vertically aligned with second plate.

Applicant is required to cancel the new matter in the reply to this Office Action."

Applicant respectfully points out that no new matter was introduced in any amendment. All of the elements in the claims are shown in the original drawings and are supported by the original specification. For example, FIG. 1 of the drawings shows all elements of the claims. As another example, page 6, line 26 of the specification describes that word line 112 of FIG. 1 operates as a gate for access transistor 111. Thus, all of the elements including the gate in the claims are shown in the drawings, as originally filed.

The explanation above shows that the elements in the present claims are shown in the drawings and are supported by the specification. Accordingly, Applicant requests that the objection be reconsidered and withdrawn.

### **§112 Rejection of the Claims**

Claims 17-19, 31, 32, 37, 46, and 48 were rejected under 35 USC § 112, first paragraph, as failing to comply with written description requirement. The claims contain subject matter which was not described in the specification in such a way as to reasonably convey to one skilled

in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Applicant respectfully points out that independent claims 17 and 31 meet the written description requirement under 35 USC § 112, first paragraph. For example, FIG. 1 of the drawings shows all elements recited in claims 17 and 31. As another example, page 6, lines 21-23 of the specification describes that word line 112 of FIG. 1 operates as a gate for access transistor 111. Further, FIG. 1 shows that word line 112 or gate 112 is vertically aligned with second plate 120. Therefore, claims 17 and 31 meet the written description requirement under 35 USC § 112, first paragraph.

Applicant amended dependent claims 19 and 32 only to correct the material type of the first plate.

Applicant requests that the rejection be reconsidered and withdrawn.

### **§103 Rejection of the Claims**

**Claims 17-19, 22, 23, 25, 31-34, 37-39, 41-46, and 48-49 were rejected under 35 USC § 103(a) as being unpatentable over Itoh (U.S. 4,920,389) in view of Kanetaki et al. (U.S. 4,906,590).**

Applicant respectfully traverses because a *prima facie* case of obviousness has not been made.

Independent claim 22 recites:

a vertical transistor formed outwardly from a substrate, the transistor including a first source/drain region, a body region and a second source/drain region that are vertically aligned;

wherein a surface of the second source/drain region includes integral therewith a first plate having a polycrystalline surface layer that is etch-roughened;

a trench capacitor having a second plate that is formed in a trench that surrounds the first plate; and

wherein the first plate forms a conductorless electrical connection between the trench capacitor and the transistor, wherein the vertical transistor further includes a gate adjacent to the body region and the gate being vertically aligned with the second plate.

Applicant is unable to find in Itoh and Kanetaki et al. all of the elements recited in claim 22. For example, Applicant is unable to find in Itoh and Kanetaki et al. a second plate that is formed in a trench that "surrounds the first plate" **and** a gate adjacent to the body region and "the gate being vertically aligned with the second plate".

Itoh discloses a device having a structure different from the structure of the device claimed in claim 22. Itoh is believed to disclose in FIG. 8(k) a device having a first electrode or first plate 202 surrounded by a second electrode or second plate 216. Itoh further discloses in FIG. 8(k) a gate 234. However, gate 234 of Itoh is located in a hole and is vertically aligned with first plate 202. Gate 234 of Itoh does not vertical aligned with second plate 216. Accordingly, Applicant requests that that rejection of claim 22 and its dependent claims 23 and 25 be reconsidered and withdrawn and that claims 22, 23, and 25 be allowed.

Independent claim 31 is amended. As amended, claim 31 recites, among other things, "the first plate surrounds at least a portion of the second plate" and "a gate adjacent to the body region and the gate being vertically aligned with the polysilicon second plate".

Applicant is unable to find in Itoh and Kanetaki et al. "the first plate surrounds at least a portion of the second plate" and "a gate adjacent to the body region and the gate being vertically aligned with the polysilicon second plate". Therefore, Applicant requests that that rejection of claim 31 and its dependent claim 32, 37, and 48 be reconsidered and withdrawn and that claims 31, 32, 37, and 48 be allowed.

Independent claim 34 is amended for clarity. Claim 34 recites, among other things, "a second plate that is formed in a trench and that surrounds at least the etch-roughened surface of the first plate" and "a gate adjacent to the body region and the gate being vertically aligned with the second plate". Applicant is unable to find in Itoh and Kanetaki et al. "a second plate that is formed in a trench and that surrounds at least the etch-roughened surface of the first plate" and "a gate adjacent to the body region, the gate being vertically aligned with the second plate". Accordingly, Applicant requests that that rejection of claim 34 and its dependent claim 39 be reconsidered and withdrawn and that claims 34 and 39 be allowed.

Independent claim 41 is amended for clarity. Claim 41 recites, among other things, "a second capacitor plate of polycrystalline material formed so as to surround the first capacitor plate" and "a gate adjacent to the body region and the gate being vertically aligned with the

second plate". Applicant is unable to find in Itoh and Kanetaki et al. "a second capacitor plate of polycrystalline material formed so as to surround the first capacitor plate" and "a gate adjacent to the body region and the gate being vertically aligned with the second plate". Accordingly, Applicant requests that that rejection of claim 41 and its dependent claims 42-44 be reconsidered and withdrawn and that claims 41-45 be allowed.

**Claims 26-27, 29, 35, 36, 40, 47, and 50 were rejected under 35 USC § 103(a) as being unpatentable over Itoh (U.S. 4,920,389) in view of Kanetaki et al. (U.S. 4,906,590) as applied to claims 17-19, 22-23, 25, 31-34, 37-39, 41-46, and 48-49 above, and further in view of Wahlstrom (U.S. 5,396,452).**

Applicant respectfully traverses because a *prima facie* case of obviousness has not been made.

Independent claim 26 is amended. As amended, claim 26 recites, among other things, "a second plate of the trench capacitor disposed adjacent to the first plate and surround the first plate" and "a gate adjacent to the body region, the gate being vertically aligned with the second plate". Applicant is unable to find in Itoh, Kanetaki et al. and Wahlstrom "a second plate of the trench capacitor disposed adjacent to the first plate and surround the first plate" and "a gate adjacent to the body region, the gate being vertically aligned with the second plate". Accordingly, Applicant requests that that rejection of claim 26 and its dependent claims 27, 29, and 47 be reconsidered and withdrawn and that claims 26, 27, 29, and 47 be allowed.

Independent claim 35 recites, among other things, "a second plate of the trench capacitor disposed so as to surround at least the micro-roughened surface of the first plate" and "a gate adjacent to the body region and the gate being vertically aligned with the second plate". Applicant is unable to find in Itoh, Kanetaki et al. and Wahlstrom "a second plate of the trench capacitor disposed so as to surround at least the micro-roughened surface of the first plate" and "a gate adjacent to the body region and the gate being vertically aligned with the second plate". Accordingly, Applicant requests that that rejection of claim 35 and its dependent claims 36, 40, and 50 be reconsidered and withdrawn and that claims 35, 36, 40, and 50 be allowed.

New Claims

Claims 52 and 53 are added. Applicant requests consideration and allowance of claims 52 and 53.

Conclusion

Applicant respectfully submits that the claims are in condition for allowance, and notification to that effect is earnestly requested. The Examiner is invited to telephone Applicant's representative at (612) 373-6969 to facilitate prosecution of this application.

If necessary, please charge any additional fees or credit overpayment to Deposit Account No. 19-0743.

Respectfully submitted,


LEONARD FORBES ET AL.

By their Representatives,

SCHWEGMAN, LUNDBERG, WOESSNER & KLUTH, P.A.  
P.O. Box 2938  
Minneapolis, MN 55402  
(612) 373-6969

Date October 27, 2004

By



Viet V. Tong

Reg. No. 45,416

CERTIFICATE UNDER 37 CFR 1.8: The undersigned hereby certifies that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail, in an envelope addressed to: MS Amendment, Commissioner of Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on this 28 day of October, 2004.

KACIA LEE

Name

Kacia Lee

Signature